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EXAMINER

PEREZ DAPLE, AARON C

ART UNIT	PAPER NUMBER
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2154

DATE MAILED: 05/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/731,773

Applicant(s)

KONDO, HIDETOSHI

Examiner

Aaron C. Perez-Daple

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 December 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/11/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Action is in response to Amendment filed 12/29/04, which as been fully considered.
2. Amended claims 1-16 and new claims 17-20 are presented for examination.
3. This Action is FINAL.

Claim Objections

4. Claims 1, 2, 6, 7, 12 and 13 are objected to because of the following informalities: the last line of each claim recites "in only one *mode* device" where it should recite --in only one node device--. Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claims 1-10 and 12-16** are rejected under 35 U.S.C. 102(e) as being anticipated by Carpenter (US 6,067,603) (hereinafter Carpenter).
7. Carpenter was cited by the Examiner in a previous Office Action.
8. As for claim 1, Carpenter discloses a data access method used in a network system having several node devices connected for communications configured so that each node device can execute certain processing by accessing memories in said several node devices or cache memories at a higher access speed (Fig. 1), said method comprising:

in each node device (processing nodes 10a-10d, Fig. 1):

executing a speculative access to said memories in the system while reading out, from a tag memory, a tag information as information related to a data storage status in said cache memories provided in the system (col. 7, line 47 – col. 8, line 51), and

deciding whether or not to abolish the data acquired from said memories by said speculative access according to said tag information read out (col. 8, line 42-51),

wherein said tag information indicates a data storage status comprising one of three possible states, including:

- 1) data is not found in any of said nodes (Table VI, status invalid);
- 2) data is found in more than one of said node devices (col. 7, lines 47-55); and
- 3) data is found in only one node device (col. 7, lines 47-55).

9. As for claim 2, Carpenter discloses a data access method used in a network system having several node devices connected for mutual communications configured so that each node device can execute certain processing by reading out data from memories in said several node devices or cache memories at a higher access speed (Fig. 1), said method comprising

in each node device (processing nodes 10a-10d, Fig. 1):

executing a speculative readout of data from said memories in the node devices while reading out, from a tag memory, a tag information as information related to a data storage status in said cache memories provided in the system (col. 7, line 47 – col. 8, line 51),

judging whether a same data as a data subject to said speculative readout is in any of the cache memories based on said tag information read out (col. 7, line 47 – col. 8, line 29),

sending said speculative readout data to a processor in a self node device when the same data as the data subject to said speculative readout is not found in any of the cache memories (col. 8, line 31 – col. 11, line 44; Table VIII), and

acquiring, when the same data as the data subject to said speculative readout is in one of the cache memories, such data in said cache memory and sending said data to the processor in the self node device (col. 8, lines 42-51; Table VIII),

wherein said tag information indicates a data storage status comprising one of three possible states, including:

- 1) data is not found in any of said nodes (Table VI, status invalid);
- 2) data is found in more than one of said node devices (col. 7, lines 47-55); and
- 3) data is found in only one node device (col. 7, lines 47-55).

10. As for claim 3, Carpenter discloses a data access method used in a network system as set forth in claim 2 wherein

said speculative readout data is abolished when said data found in the cache memory is acquired and sent to the processor in the self node device (col. 8, line 31 – col. 11, line 44; Table VII).

11. As for claim 4, Carpenter discloses a data access method used in a network system as set forth in claim 2 wherein

each node device speculatively reads out the data from the memory in the self node device while reading out said tag information from the tag memory (col. 7, line 47 – col. 8, line 51; see also col. 4, lines 6-27).

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12. As for claim 5, Carpenter discloses a data access method used in a network system as set forth in claim 2 wherein

each node device speculatively reads out the data from the memory in the other node device while reading out said tag information from the tag memory (col. 7, line 47 – col. 8, line 51; see also col. 4, lines 6-27).

13. As for claims 6 and 7, Carpenter discloses a network system having several node devices connected by a communication mechanism for mutual communications configured so that each node device can execute certain processing by reading out data from memories in said several node devices or cache memories at a higher access speed (Fig. 1) wherein

each node device (processing nodes 10a-10d, Fig. 1) comprising

speculative readout means (TSU 42, Fig. 2) to execute the speculative readout of the data from said memories in the node devices while reading out, from the tag memory, the tag information as the information related to the data storage status in said cache memories provided in the system (col. 7, line 47 – col. 8, line 51),

a judgment means (coherency response logic 56, Fig. 2) to judge whether the same data as the data subject to said speculative readout is in any of the cache memories based on said tag information read out (col. 7, line 47 – col. 8, line 51; col. 9, line 59 – col. 10, line 42), and

a read data processing means (TRU 40, Fig. 2) which sends said speculative readout data to the processor in the self node device when the same data as the data subject to said speculative readout is judged not existing in any of the cache memories and, when the same data is judged existing in one of the cache memories, acquires such data in said cache

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memory and sends said data to the processor in the self node device (col. 7, lines 1-24; col. 8, line 31 – col. 11, line 44; Tables VII and VIII).

14. As for claim 8, Carpenter discloses a network system as set forth in claim 7 wherein said data processing means abolishing said speculative readout data when said data found in the cache memory is acquired and sent to the processor in the self node device (col. 8, line 42-51; Table VII).

15. As for claim 9, Carpenter discloses a network system as set forth in claim 7 wherein said speculative readout means speculatively reads out the data from the memory in the self node device (col. 7, line 47 – col. 8, line 51; see also col. 4, lines 6-27).

16. As for claim 10, Carpenter discloses a network system as set forth in claim 7 wherein said speculative readout means speculatively reads out the data from the memory in the other node device (col. 7, line 47 – col. 8, line 51; see also col. 4, lines 6-27).

17. As for claim 12, Carpenter discloses a computer readable memory storing a data access program for controlling the data access in a network system having several node devices connected for mutual communications configured so that each node device can execute certain processing by accessing memories in said several node devices or cache memories at a higher access speed (Fig. 1), said data access program executing:

speculative access processing for the memories in the system while reading out, from a tag memory, tag information as information related to a data storage status in said cache memories provided in the system (col. 7, line 47 – col. 8, line 51) and

processing to judge whether or not to abolish data acquired from said memories by said speculative access according to said tag information read out (col. 8, lines 42-51; Table VII),

wherein said tag information indicates a data storage status comprising one of three possible states, including:

- 1) data is not found in any of said nodes (Table VI, status invalid);
- 2) data is found in more than one of said node devices (col. 7, lines 47-55); and
- 3) data is found in only one node device (col. 7, lines 47-55).

18. As for claim 13, Carpenter discloses a computer readable memory storing a data access program for controlling the data access in a network system having several node devices connected for mutual communications configured so that each node device can execute certain processing by reading out data from memories in said several node devices or cache memories at a higher access speed (Fig. 1), said data access program executing:

speculative readout processing to read out data from said memories in the node devices while reading out, from a tag memory, tag information as information related to a data storage status in said cache memories provided in the system (col. 7, line 47 – col. 8, line 51);

judgment processing to judge whether same data as data subject to said speculative readout is found in any of the cache memories based on said tag information read out (col. 8, lines 42-51; Table VII); and

processing when the same data as the data subject to said speculative readout is not found in any of the cache memories to send said speculative readout data to a processor in the self node device (col. 8, line 31 – col. 11, line 44; Tables VII and VIII); and,

processing, when the same data as the data subject to said speculative readout is found in one of the cache memories to acquire such data in said cache memory and send said data to the processor in the self node device (col. 8, line 31 – col. 11, line 44; Tables VII and VIII),

wherein said tag information indicates a data storage status comprising one of three possible states, including:

- 1) data is not found in any of said nodes (Table VI, status invalid);
- 2) data is found in more than one of said node devices (col. 7, lines 47-55); and
- 3) data is found in only one node device (col. 7, lines 47-55).

19. As for claim 14, Carpenter discloses a computer readable memory storing a data access program for controlling the data access in a network system as set forth in claim 13 wherein said data access program

abolishes said speculative readout data when acquiring the data in said cache memory and send such data to the processor in the self node device (col. 8, line 42-51; Table VII).

20. As for claim 15, Carpenter discloses a computer readable memory storing a data access program for controlling data access in a network system as set forth in claim 13 wherein said data access program

speculatively reads out data from memories in the self node device while reading out said tag information from the tag memory (col. 7, line 47 – col. 8, line 51; see also col. 4, lines 6-27).

21. As for claim 16, Carpenter discloses a computer readable memory storing a data access program for controlling the data access in a network system as set forth in claim 13,

wherein said data access program speculatively reads out data from memories in another node device while reading out said tag information from the tag memory (col. 7, line 47 – col. 8, line 51; see also col. 4, lines 6-27).

Claim Rejections - 35 USC § 103

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

23. **Claim 11** is rejected under 35 U.S.C. 103(a) as being obvious over Carpenter in view of Jhang et al. (US 6,253,292 B1).

24. Jhang was cited by the Examiner in a previous Office Action.

25. As for claim 11, Carpenter does not specifically disclose providing a tag memory in the communication mechanism. Jhang teaches providing a tag memory in a communication mechanism (remote cache 417-2, Fig. 4B; col. 5, lines 32-48). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Carpenter by providing a tag memory in the communication mechanism in order to facilitate data transfer between devices and maintain system coherency, as taught by Jhang (remote cache 417-2, Fig. 4B; col. 5, lines 32-48). The modification would further provide the additional advantage of reducing system memory requirements, improving system coherency, and improving the flexibility and efficiency of the system through the use of a single shared memory, as taught by Jhang (col. 1, lines 13-22).

26. **Claims 17-20** are rejected under 35 U.S.C. 103(a) as being obvious over Carpenter in view of Quach et al. (US 6,505,318 B1) (hereinafter Quach).

27. Carpenter teaches deciding whether or not to abolish the data acquired from said memories by said speculative access based upon a status of said speculative access, including

a “Modify found” bit that defines whether said data has been found to be currently in a cache memory in one of said node devices in said system (col. 4, lines 29-47; col. 8, lines 42-51).

In particular, Applicant’s specification on pg. 17, lines 8-19, states that the MESI protocol is used with respect to defining the status of the speculative read. Carpenter also discloses using the MESI protocol for the same purpose (col. 4, lines 29-47). Carpenter does not explicitly disclose that the status is defined by a combination of five bits; Carpenter is silent on this point. Quach teaches that it is well-known to determine a status of a cache look-up using five bits according to the MESI protocol (col. 2, lines 45-64). Furthermore, because Carpenter discloses using the MESI protocol, this feature is arguably inherent to Carpenter. Nonetheless, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Carpenter by using a logical combination of five bits of information defining a status of the speculative access in order to effectively maintain system coherency and minimize the potential for errors, as taught by Quach (col. 2, lines 45-64).

Response to Arguments

112 Claim Rejections

28. The rejection of claims 1-16 under 35 U.S.C. 112, second paragraph, for various informalities is hereby withdrawn in view of Amendment.

102 Claim Rejections

29. Applicant’s arguments filed 12/29/04 have been fully considered but they are not persuasive.

Specifically, Applicant asserts that Carpenter fails to disclose the newly added claim limitation that said tag information indicates a data storage status comprising one of three possible states, including: 1) data is not found in any of said nodes; 2) data is found in more than one of said node devices; and 3) data is found in only one node device. The Examiner respectfully disagrees. With respect to item 1, this is anticipated by the Invalid response of Table VI in Carpenter, which indicates that the cache line is not held in any remote node. With respect to items 2 and 3, col. 7, lines 47-55 in Carpenter, recite that, "The address indication for each cache line is stored in association with an identifier *of each remote processing node having a copy of the cache line* and the coherency status of the cache line at each such processing node (emphasis added)." Because the tag memory includes an entry for each remote processing node having a copy of the cache line, the tag memory includes information for indicating if only one node device (only one entry) or more than one node device (multiple entries) contain the data. Therefore Carpenter anticipates this limitation of the claims, and claims 1-10 and 12-16 are properly rejected under 35 USC 102(e).

103 Claim Rejections

30. Applicant's arguments filed 12/29/04 have been fully considered but they are not persuasive.

Applicant asserts that the Examiner has failed to provide a proper motivation for the combination of Carpenter and Jhang. The Examiner respectfully disagrees. Specifically, Carpenter teaches providing a tag memory in each of the node controllers of Fig. 1.

However, as understood by one of ordinary skill in the art and further taught by Jhang, there are several advantages to providing a single shared tag memory located in the

communication mechanism. These advantages include reducing system memory requirements (since only one memory is required instead of one for each node), improving system coherency (coherency does not need to be maintained between the individual tag memories of each node), and improving the flexibility and efficiency of the system.

Therefore, Jhang teaches an improvement over the design of Carpenter, which improvement would have been obvious to one of ordinary skill in the art at the time of the invention, and the rejection of claim 11 under 35 U.S.C. 103(a) is proper.

Conclusion

31. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron C. Perez-Daple whose telephone number is (571) 272-3974. The examiner can normally be reached on 9am-5pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Follansbee can be reached on (571) 272-3964. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

 4/29/05

Aaron Perez-Daple

